

Appl. No. 09/938,399
Amdt. dated September 15, 2004
Reply to Office Action of June 17, 2004

PATENT

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Claims 1.-10. (canceled)

Claim 11. (currently amended) An apparatus for forming a first porous dielectric layer and a second capping layer on a semiconductor substrate, the apparatus comprising:

- (a) an atmospheric chemical vapor deposition chamber;
- (b) a plasma system associated with the atmospheric chemical vapor deposition chamber;
- (c) a spin coating chamber coupled to the atmospheric chemical vapor deposition chamber;
- (d) a curing station coupled to the atmospheric chemical vapor deposition chamber; and
- (e) a substrate handling system adapted to transfer substrates between the atmospheric chemical vapor deposition chamber, the spin coating chamber, and the curing station,

wherein the spin coating chamber comprises a first material comprising a sol-gel solution used to form the first porous dielectric layer and wherein the atmospheric chemical vapor deposition chamber comprises a second material used to form the second capping layer, and wherein the curing chamber is capable of curing the sol-gel solution to form the first porous dielectric layer,

wherein all processing stations in the apparatus are at atmospheric pressure and no vacuum pumps are present in the apparatus.

Claim 12. (previously presented) The apparatus of claim 11 wherein the plasma system is a remote plasma system adapted to generate a plasma upstream of the atmospheric chemical vapor deposition chamber.

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Claim 13. (original) The apparatus of claim 11 wherein the substrate handling system comprises a plurality of substrate handlers with arms.

Claim 14. (original) The apparatus of claim 11 wherein the apparatus is a cluster tool.

Claim 15. (previously presented) The apparatus of claim 13 wherein the apparatus is a cluster tool.

Claims 16.-26. (canceled)

Claim 27. (currently amended) An apparatus comprising:

(a) a first atmospheric deposition station comprising a first material capable of forming a first dielectric layer on a semiconductor substrate;

(b) a second atmospheric deposition station comprising an atmospheric pressure vapor deposition chamber and comprising a second material capable of forming a second dielectric layer on the semiconductor substrate, wherein the first atmospheric deposition station and the second atmospheric deposition station are coupled together; and

(c) a substrate handling system adapted to transfer the substrate into and out of the first atmospheric deposition station and the second atmospheric deposition station, and wherein a plasma system is associated with the atmospheric pressure vapor deposition chamber, and

wherein all processing stations in the apparatus are at atmospheric pressure and no vacuum pumps are present in the apparatus, and wherein the first atmospheric deposition station comprises a spin coating chamber.

Claim 28. (canceled)

Claim 29. (currently amended) ~~The apparatus of claim 27~~ An apparatus comprising:

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(a) a first atmospheric deposition station comprising a first material capable of forming a first dielectric layer on a semiconductor substrate;

(b) a second atmospheric deposition station comprising an atmospheric pressure vapor deposition chamber and comprising a second material capable of forming a second dielectric layer on the semiconductor substrate, wherein the first atmospheric deposition station and the second atmospheric deposition station are coupled together; and

(c) a substrate handling system adapted to transfer the substrate into and out of the first atmospheric deposition station and the second atmospheric deposition station, and wherein a plasma system is associated with the atmospheric pressure vapor deposition chamber, and

wherein all processing stations in the apparatus are at atmospheric pressure and no vacuum pumps are present in the apparatus,

wherein the first atmospheric deposition station comprises an ultrasonic spray deposition device.

Claim 30. (previously presented) The apparatus of claim 27 wherein the plasma system is a remote plasma system that is adapted to form a plasma upstream of the atmospheric pressure vapor deposition chamber.

Claim 31 (currently amended) ~~The apparatus of claim 27 further comprising~~ An apparatus comprising:

(a) a first atmospheric deposition station comprising a first material capable of forming a first dielectric layer on a semiconductor substrate;

(b) a second atmospheric deposition station comprising an atmospheric pressure vapor deposition chamber and comprising a second material capable of forming a second dielectric layer on the semiconductor substrate, wherein the first atmospheric deposition station and the second atmospheric deposition station are coupled together; and

(c) a substrate handling system adapted to transfer the substrate into and out of the first atmospheric deposition station and the second atmospheric deposition station, and

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wherein a plasma system is associated with the atmospheric pressure vapor deposition chamber, and

wherein all processing stations in the apparatus are at atmospheric pressure and no vacuum pumps are present in the apparatus, and

wherein the apparatus further comprises a curing station capable of curing the first material on the semiconductor substrate.

Claim 32. (currently amended) ~~The apparatus of claim 27~~ An apparatus comprising:

(a) a first atmospheric deposition station comprising a first material capable of forming a first dielectric layer on a semiconductor substrate;

(b) a second atmospheric deposition station comprising an atmospheric pressure vapor deposition chamber and comprising a second material capable of forming a second dielectric layer on the semiconductor substrate, wherein the first atmospheric deposition station and the second atmospheric deposition station are coupled together; and

(c) a substrate handling system adapted to transfer the substrate into and out of the first atmospheric deposition station and the second atmospheric deposition station, and

wherein a plasma system is associated with the atmospheric pressure vapor deposition chamber, and

wherein all processing stations in the apparatus are at atmospheric pressure and no vacuum pumps are present in the apparatus, and

wherein the first material comprises a sol-gel material.

Claim 33. (currently amended) The apparatus of claim 1 ~~32~~ wherein the first dielectric layer is a porous dielectric layer, and the second dielectric layer is a capping layer.